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Rural Water Supplies in South Dakota : Brown County

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BROWN County

January, 1940
Special Extension Circular
Number 47

Extension Service
South Dakota State College
Brookings, S. D.

RURAL WATER SUPPLIES

IN

SOUTH DAKOTA

BROWN COUNTY

BY

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AND

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PREPARED BY THE WORK PROJECTS ADMINISTRATION AS A REPORT ON THE WELL SURVEY CONDUCTED AS WORK PROJECTS ADMINISTRATION OFFICIAL PROJECT 665-74-3-126; SPONSORED BY THE EXTENSION SERVICE AND THE EXPERIMENT STATION, SOUTH DAKOTA STATE COLLEGE, IN COOPERATION WITH THE STATE GEOLOGICAL SURVEY:

JANUARY 1940

FOREWORD

This study was first proposed as a project of the Mineral Resources Committee of the State Planning Board under the direction of the State Geological survey and undertaken as a Work Projects Administration project sponsored by the State Planning Board, and was continued under the Planning Board until that body was abolished July 1, 1939 by the State Legislature. At that time sponsorship was transferred to the South Dakota Agricultural Experiment Station and the State College Extension Service, South Dakota State College. Field work was begun October 1, 1938 and was practically completed by February 15, 1939. Workers were assigned in the several counties under the supervision and direction of the County Agricultural Agents and Field Supervisors who were employed by the Work Projects Administration. Questionnaires were mailed out from the offices of the County Agents and were checked and tabulated in these offices. The material was then forwarded to the central office for final tabulation and analysis under the direction of Elmer E. Meleen and Walter V. Searight.

Particular credit should be given to the individual County Agricultural Agents in the various counties of the state who arranged the contacts with the individuals from whom these data were collected, furnished a large portion of the necessary supplies for field work, and directed the workers engaged in collecting field data. Without this assistance in gathering basic data, this study could not have been conducted. The value of the report is therefore in direct proportion to the accuracy and adequacy of these basic data.

INTRODUCTION

PURPOSE

This report on rural water supplies of South Dakota has been prepared to present data recently made available on the types and the sources of water supply, exclusive of stream, lake and dam waters. The information presented is of importance to evaluate present supplies. It should also prove useful as a basis for further development of supplies where they are needed or become necessary. Further, it is hoped that the facts presented may prove of value in any program of water conservation.

SOURCES OF INFORMATION

Questionnaires were sent to all, or essentially all of the farmers of the state, asking for complete data on farm wells and supplementary supplies, with the exception of the supplies above noted. A most gratifying number returned questionnaires, actually 60.1% average for the entire state. The coverage is probably more than 60.1% since it is likely that many unanswered inquiries were those to farmers who were without wells, the type of supply emphasized in the questionnaires. The data thus obtained were supplemented with information contained in the files of the State Geological Survey, the office of the State Engineer, and reports of the United States Geological Survey. This supplementary information, together with that contained in questionnaires was used in making the well location maps included in this report.

PROCEDURE

All data from the questionnaires were tabulated and analyzed statistically by counties, which were made the areal units of study. Within the county,

Acknowledgments - The authors wish especially to acknowledge and commend the conscientious assitance of Mr. E. L. Woodburn, Supervisor, for careful and painstaking supervision of statistical work. The authors also desire to express appreciation for the constant interest and support of this project by Mr. Bob Butts, Director of Research and Records Projects, South Dakota Work Projects Administration.

supplies were allocated as to kind on county maps. Since shallow waters are the most important source of rural supply in South Dakota, wells 200 feet deep and less were plotted on county maps from which maps indicating depths of wells by 50 foot intervals were made. Springs, shown on the well location map, and cisterns were also tabulated as important supplementary supplies, although the latter do not appear on maps or in the tables in this report.

PRESENTATION OF DATA

For convenience and utility, this report has been divided into sections each covering one county, and each county section bound separately. Each county report contains the following material wherever possible.

1. Well Location Map: This map shows the location of all wells and springs within the county, so far as information is now available. These have been plotted in such a manner that artesian and shallow wells can be differentiated readily by the reader. Artesian wells, where they occur, are divided into flowing and pumped. Artesian wells showing decreased flow and those reported as controlled are also indicated by symbols. Shallow wells are differentiated as adequate and inadequate, and dry holes as of 1938 are located. Wells from other sources of information other than questionnaires collected by this survey are shown in blue.

2. Shallow Well Map: This map shows, as accurately as possible, in 50 foot intervals, the depths at which shallow supplies are commonly obtained. Where shallow wells are abundant, as indicated by the well location map, the map is as accurate as the information on which it is based, but where such wells are sparsely distributed errors are likely to occur. In many places reports of shallow wells are absent in which case the area has been left blank.

3. Table of Pumped wells, from 0 to 200 feet (inclusive) in depth: This table shows minimum, maximum, and average depths of wells within the county, as reported in the questionnaires. Tabulations are by townships. The general character of the water, hard, medium, and soft, as reported by farm-

ers, and the number of wells suitable or unsuitable for drinking are shown in this table. Further, the adequacy of supply, as indicated on the questionnaires, and use for irrigation are shown here.

4. Table of Wells greater in depth than 200 feet: Minimum, maximum, and average depths are indicated. Character, reported as hard, medium or soft is tabulated. Adequacy and use for irrigation are shown as in the preceding table.

5. Table of Flowing Wells: Minimum, maximum, and average depths are shown together with general character and use for irrigation. The volume of flow as reported, and the number of flowing wells reported as equipped with control valves is also included in this table.

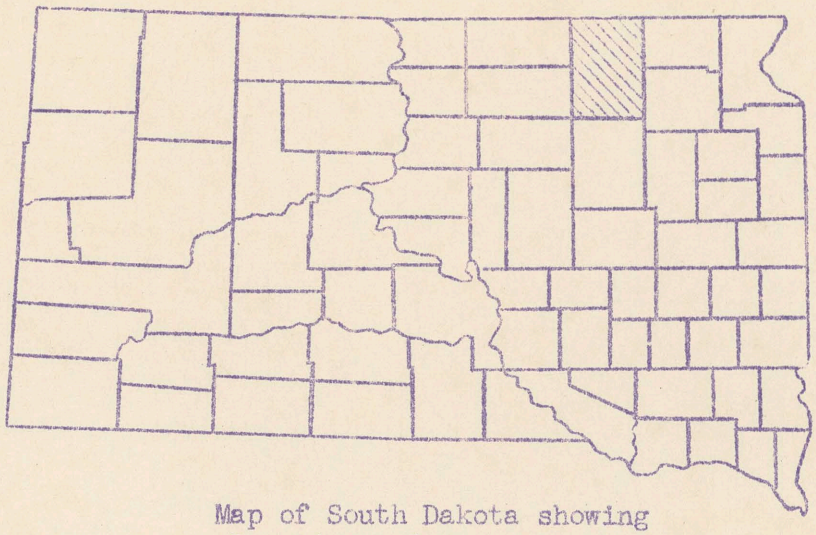
SUMMARY OF STATE SUPPLIES

In the entire state, a total of 48,479 wells were reported in response to questionnaires, returned by 60.1% of the recipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than this number since several counties with large numbers of wells returned over 75% of the questionnaires and since many farmers without wells did not reply because they were not requested to do so in the formal questionnare. Of the wells reported, 16.2% are artesian, including both pumped and flowing wells. Shallow wells are 83.8% of the wells reported. Wells from shallow sources are thus obviously by far the most important means for obtaining water in rural South Dakota.

Important supplementary supplies are cisterns and springs. Roughly, there is more than one cistern to each 40 wells. Many springs are reported, however, in counties with very few wells, so that in some localities they are of considerable importance.

BROWN COUNTY

Brown county lies in the north central part of northeastern South Dakota. The northern boundary is shared with North Dakota. It is bounded on the east by Marshall and Day counties, on the south by Spink county, and on the west by McPherson and Edmunds counties.



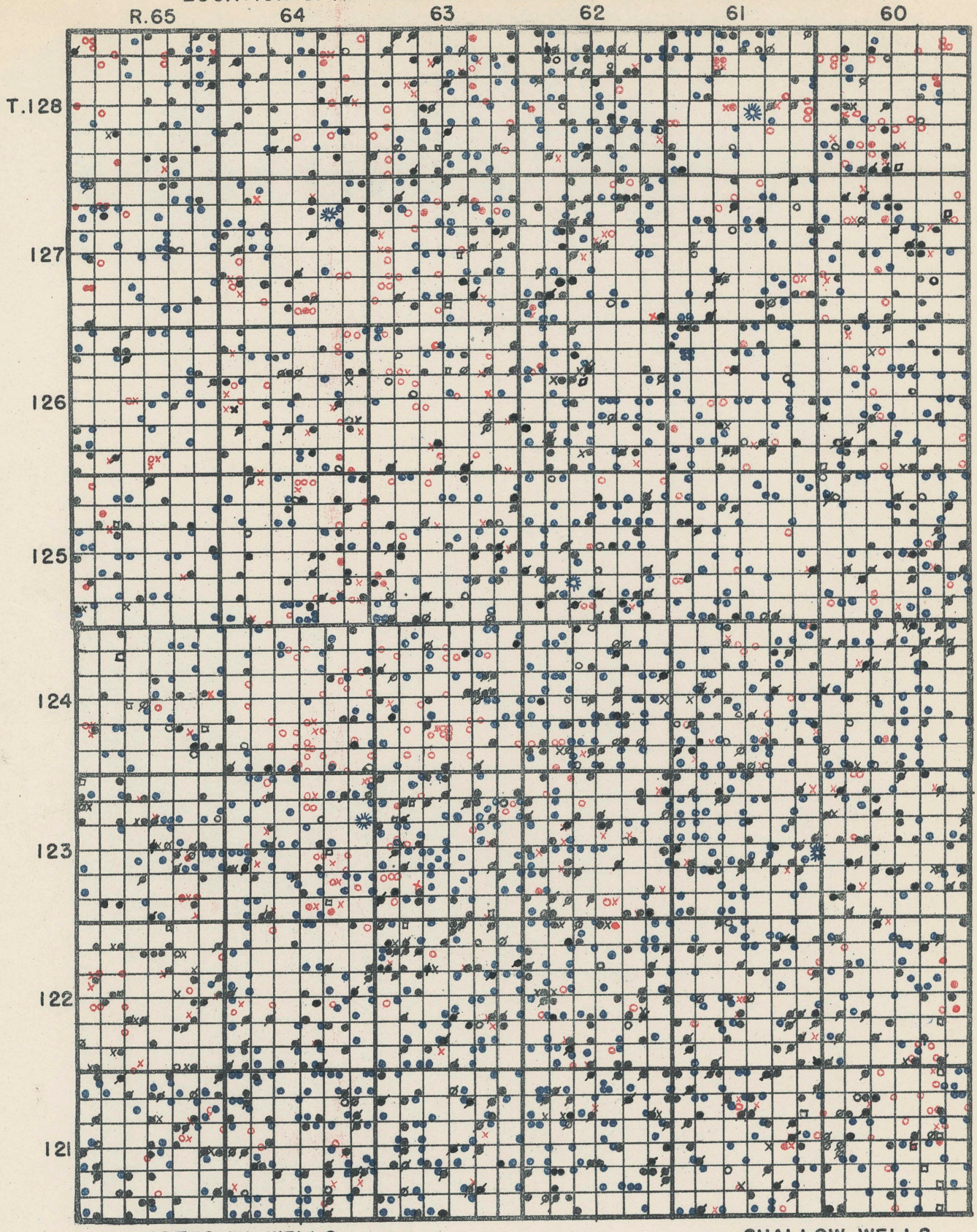
Map of South Dakota showing location of Brown county

Brown county is the largest county east of the Missouri river in South Dakota and is a block of farm land, 90.1 per cent of which is farmed. The farmed area, 1,008,816 acres is divided into 2,479 farm units of approximately 409 acres each. Wheat, corn, barley, hay, oats, rye and flax are the important field crops, the first five being produced in the order named. Livestock is also important, cattle, hogs and sheep being most important. Dairy products are increasingly important.*

Farm areas such as Brown county, on which livestock, hogs and dairy cattle in particular are raised, require generally distributed sources of water supply. The supplies required are not great, but adequate and constant supplies of water at relatively low cost are necessary to operate farms of these sizes and organization properly. The well location map of Brown county shows that water supplies, owing to the position of Brown county in the artesian ba-

*South Dakota Agricultural Statistics, Annual Report, 1937

LOCATION OF ARTESIAN AND SHALLOW WELLS IN BROWN COUNTY



ARTESIAN WELLS

- O FLOWING WELLS—STEADY OR INCREASING
- ● FLOWING WELLS—DECREASED FLOW
- X CEASED FLOWING
- □ PUMPED
- / CONTROLLED WELLS Ø ø

SHALLOW WELLS

- O ADEQUATE SUPPLY
- ● INADEQUATE SUPPLY
- X DRY WELLS
- □ SPRINGS

- ● WELLS FROM OTHER SOURCES
- ☼ CITY WELLS

sin are available and widely distributed over the county.

On the well location map of Brown county, all flowing and deep pumped wells obtaining water from the Dakota-Lakota sandstones are shown in black as artesian wells. All other wells are shown in red and are included with shallow wells regardless of depth. On all other maps, in all tables, and in the text, all wells 200 feet or less in depth are shallow wells and all wells more than 200 feet deep are treated as deep wells, whatever the depth or source, unless otherwise stated. Thus the artesian wells of Brown county, except as noted, are included with the deep wells.

DEPTH AND DISTRIBUTION

Situated as it is in the midst of the artesian basin of South Dakota (see well location map, artesian map of Brown county and artesian water map of South Dakota) most of the water supplies of Brown county are obtained from deep wells and a relatively small part from shallow wells. Wells are widely and evenly distributed over the county (well location map).

Replies to questionnaires returned by 64.7 per cent of those sent to farmers of Brown county report 1590 wells, somewhat less than one well to each section. Wells from other sources (well location map) are reported in many places. Some of these are possibly duplications of those reported by questionnaires and many are not in use. In Brown county, however, there probably is at least one well to each square mile.

Shallow wells, 200 feet deep or less, although of less importance than deep wells, make up 22.3 per cent, between one fifth and one fourth of the wells, according to those reported. In 12 townships, however, more than 30 per cent of the wells were reported to be shallow, six townships reported more than 40 per cent, and two townships, T.124N., R.63W., and T.124N., R.64W., reported more than half to be shallow wells with 53.7 and 68.2 per cent respectively.

Those townships reporting more than 40 per cent of the wells to be shal-

low are tabulated as follows:

T.123N.	R.64W.	47.0%	shallow	T.127N.	R.65W.	41.2%	shallow
127	63	42.5%	"	128	60	48.7%	"

The townships from which 30 to 40 per cent of the wells were reported to be shallow have been tabulated and are listed as follows:

T.121N.	R.60W.	33.3%	shallow	T.127N.	R.64W.	35.7%	shallow
125	64	34.3%	"	128	61	35.8%	"
126	63	37.5%	"	128	65	34.5%	"

In ten additional townships 20 to 30 per cent of the wells were reported shallow. These are included in the following tabulation:

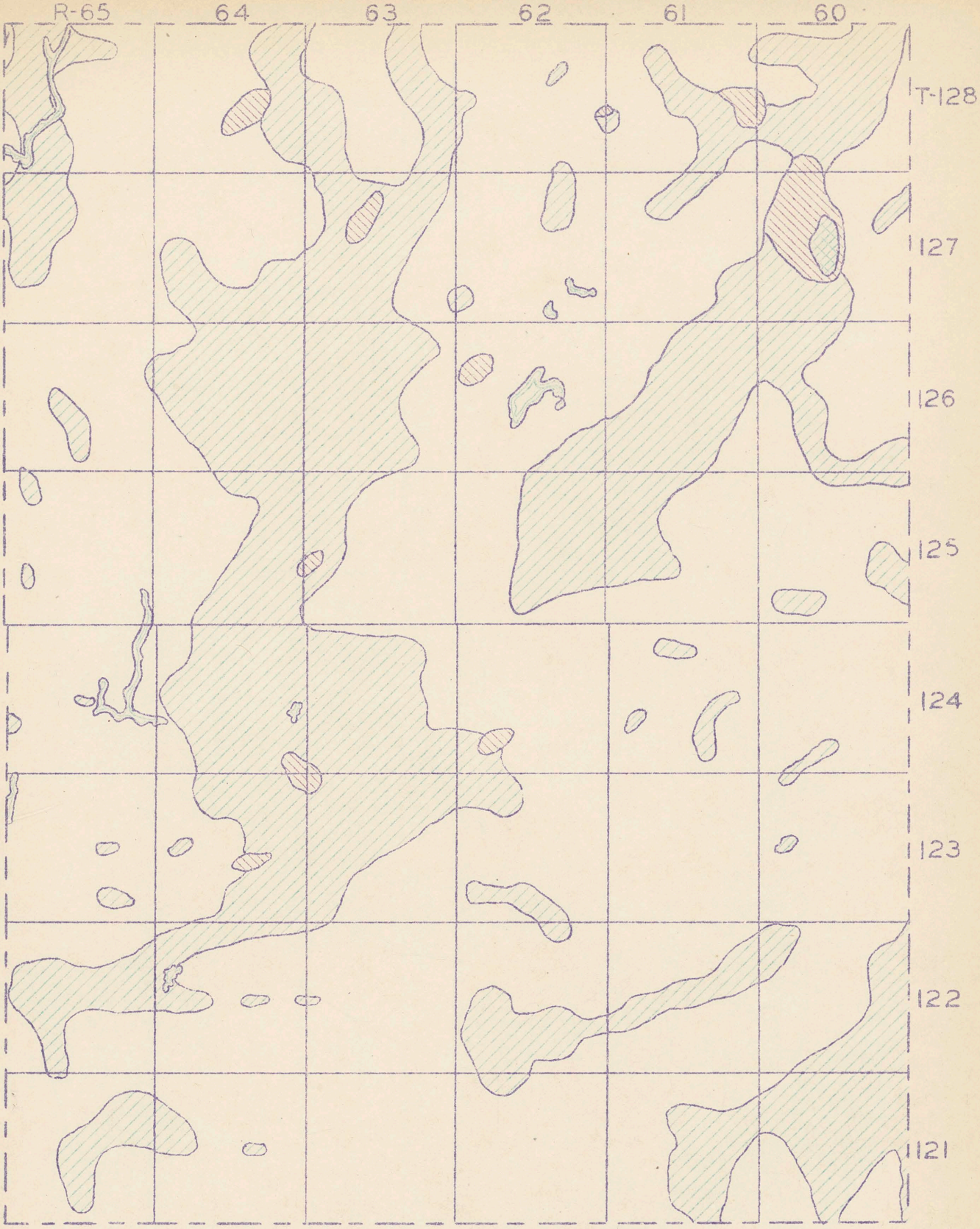
T.122N.	R.60W.	29.0%	shallow	T.126N.	R.64W.	29.0%	shallow
123	63	27.8%	"	128	63	27.0%	"
125	61	26.3%	"	127	60	24.2%	"
126	60	21.2%	"	127	61	20.8%	"
126	61	25.0%	"	128	64	25.0%	"

Most of the shallow wells of Brown county are very shallow, in fact, of those reported, 93.9 per cent are 50 feet or less in depth. Most of the remainder are betwen 50 and 100 feet deep,4 per cent. There are a few, 1.2 per cent between 100 and 150 feet deep but none are reported between 150 and 200 feet.

The shallow wells have been mapped on a basis of 50 foot depth intervals (see shallow well map). This map shows that shallow wells are mostly restricted to definite areas. A comparison of the percentages of shallow wells with this map further emphasizes the restriction of shallow wells to the areas indicated on the map. The sources of shallow water in these areas is related to sandy deposits made during the glacial period,either previous to the existence of glacial lake Dakota, or an early stage of its existence.

As previously stated, most of the wells reported for Brown county, 77.7 per cent, are deep wells. A small part of these (5.2 per cent of the total) were reported to be deep pumped wells. A total of 82 deep pumped wells are distributed among 27 townships varying in number from one to ten in each of these townships. The wells range in depth from 800 feet to 1300 feet. All reported appear to be artesian wells.

BROWN COUNTY



SHALLOW WELLS (0-200 FT)

DEPTHS AT WHICH SUPPLIES ARE COMMONLY OBTAINED

0-50 FT
50-100 FT
LAKES
100-150 FT
150-200 FT

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MILES
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Nearly three fourths, 72.5 per cent, of the wells reported from Brown county are deep flowing, hence flowing artesian wells. A total of 1153 of the 1590 wells reported are wells of this type. These wells vary, as reported, from a minimum of 250 feet to 1800 feet in depth.

Because of the great importance of deep wells, most of them flowing, they have been tabulated by townships to show the number and the per cent of total wells in the township. These data are included in the table which follows:

Twp.	Rge.	Number Wells	Percent of Total Wells	Twp.	Rge.	Number Wells	Percent of Total Wells
121N	60W	26	66.7	125N	60W	27	84.4
121	61	31	83.7	125	61	14	73.7
121	62	35	100.	125	62	26	84.0
121	63	26	100.	125	63	30	85.8
121	64	30	88.2	125	64	23	65.7
121	65	35	87.5	125	65	18	85.7
122	60	22	71.	126	60	26	78.8
122	61	35	89.7	126	61	21	75.
122	62	39	86.7	126	62	25	92.5
122	63	39	95.1	126	63	20	62.5
122	64	23	82.1	126	64	27	71.
122	65	38	80.9	126	65	13	81.3
123	60	38	92.7	127	60	25	75.8
123	61	29	100.	127	61	19	79.2
123	62	35	87.5	127	62	29	87.9
123	63	31	72.2	127	63	23	57.5
123	64	18	53.	127	64	18	64.3
123	65	28	90.5	127	65	10	58.8
124	60	28	96.6	128	60	20	51.3
124	61	32	82.	128	61	18	64.2
124	62	34	89.5	128	62	35	94.6
124	63	19	46.3	128	63	27	71.
124	64	14	31.8	128	64	21	75.
124	65	16	88.9	128	65	19	65.5

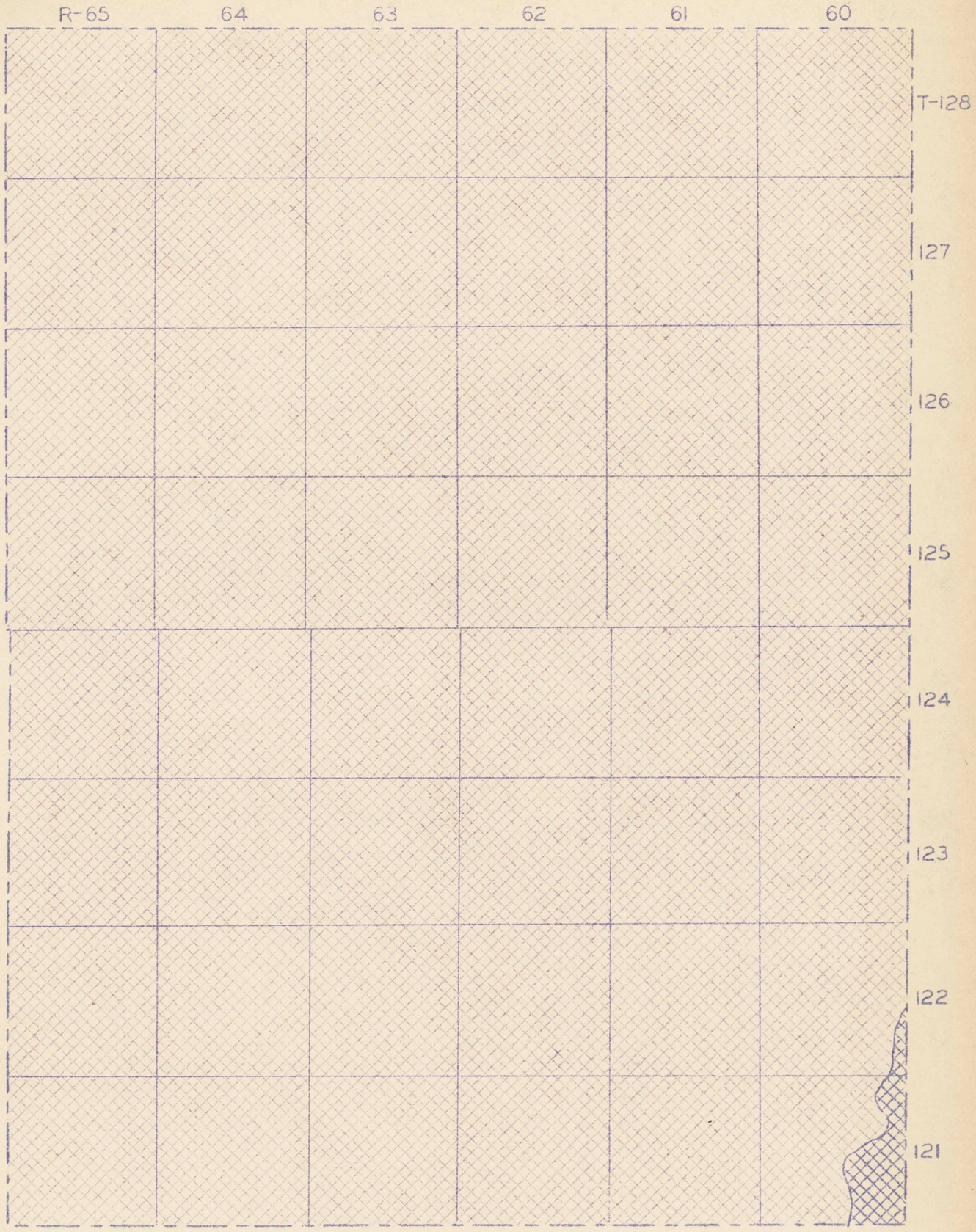
Total Number of Wells - 1235 Average Percentage- 77.7

The flow of wells in Brown county is highly variable. As indicated by reports the average flow per township (table 3) varies between 2.1 gallons per minute and 14.4 gallons per minute. A total of 426 (37 per cent of those reported) were reported to be equipped with control valves.

CHARACTER OF WELL WATERS

The character of rural well waters has been determined from reports by the users. Farmers were asked in questionnaires whether the supply used was

ARTESIAN AREAS-1938



BROWN COUNTY

FLOWING

PUMPED

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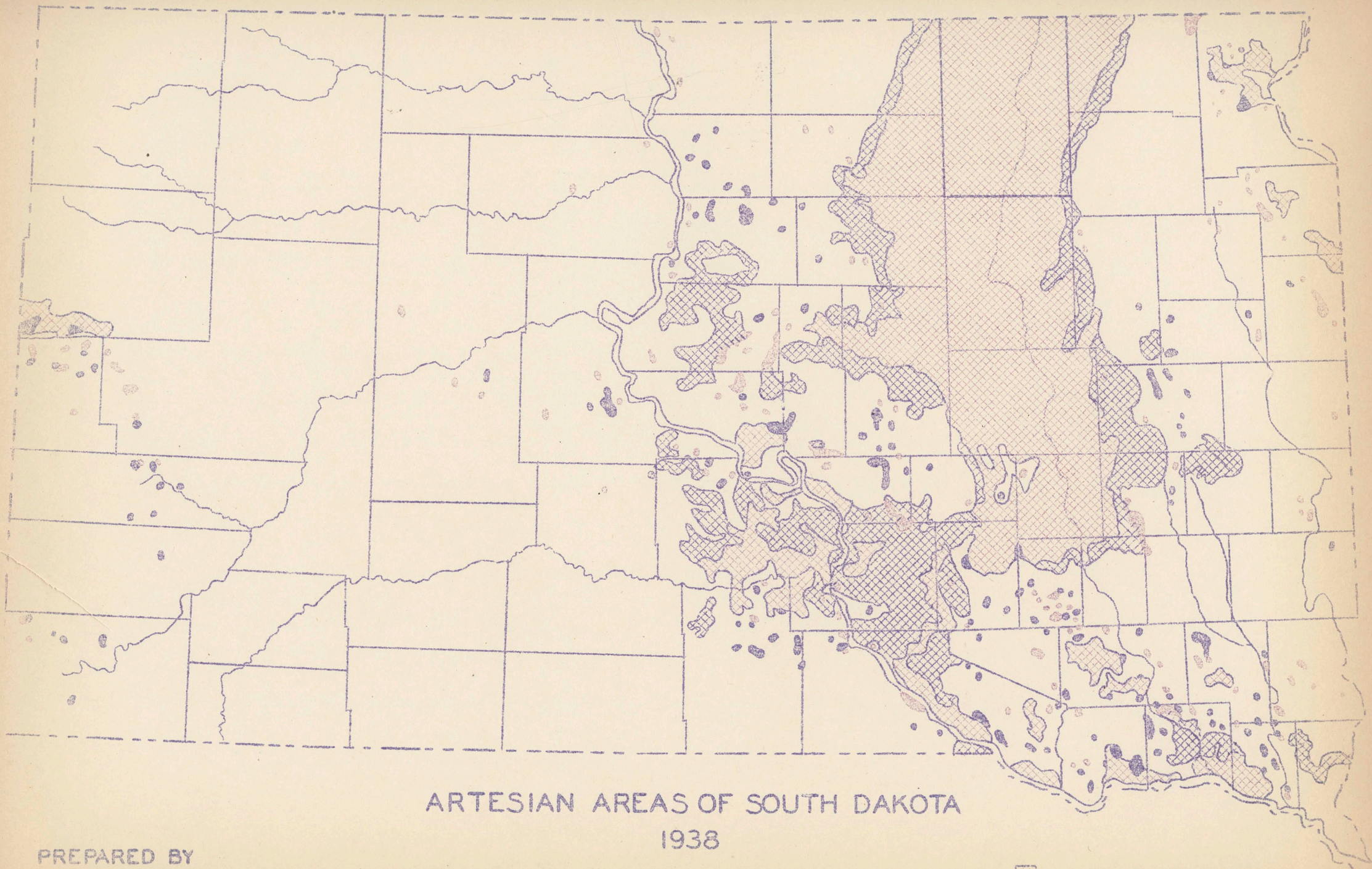

ARTESIAN AREAS OF SOUTH DAKOTA
1938

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WP 3636

considered to be hard, moderately hard, or soft and whether it was suitable for drinking. Although chemical analyses is the most satisfactory means of determining the character and quality of waters, laboratory analyses are rarely available to the farmer as a basis for judgment. Use, however, is probably a fairly good criterion of general character and quality. Accurate and detailed data on chemical character must await laboratory analysis.

Rural well waters in Brown county vary greatly in hardness. The greatest differences are betwsen waters from different sources. Those from shallow sources are reported to be dominantly hard, whereas those from deep artesian sources are dominantly soft.

The shallow waters are mostly reported to be moderately hard or definitely hard. Farmers reported on 338 of these wells that nearly two thirds, 65.1 per cent were definitely hard, and that almost a third, 31 per cent, were moderately hard. Thus, 96.1 per cent of the shallow wells reported were definitely or moderately hard, whereas only 3.9 per cent were reported soft. Evidence is conclusive that shallow waters hold little promise as sources for soft waters. Somewhat more than ten per cent, 11.9 per cent, were considered unsatisfactory for drinking.

Deep wells, whether pumped or flowing, are quite different in quality from shallow wells. Although reports were made on 35 deep pumped wells, all were reported soft or moderately hard. More than half of these, 57.2 per cent, were reported definitely soft and nearly half, 42.8 per cent, were reported moderately hard. Less than ten per cent (8.5 per cent) were reported to be unsatisfactory for drinking.

Waters from flowing wells in Brown county for the most part are even more definitely soft. A very considerable number of these were reported, 1086, of which nearly three fourths, 71.9 per cent, were reported to be soft, and most of the remainder, 21.5 per cent, were reported to be moderately hard. A total of 93.4 per cent of all artesian wells, deep flowing wells, of Brown county were reported to be soft or moderately hard, and only 6.6 per cent to

be definitely hard. Soft water occurs at depths varying from 250 feet to 1800 feet and is not confined to any localities of the county. Less than four per cent, 3.9 per cent, of the flowing wells of Brown county were reported unsatisfactory for drinking.

There is reason to suspect, however, that in some cases, at least, objectionable compounds, such as fluorides, occur in rural deep well waters of the county. Determination of these must await adequate chemical analyses.

The hardness of the wells of Brown county as reported has been tabulated for comparison. These data are as follows:

Kind of Well	Hard	Moderately Hard	Soft	Total
Shallow	220	105	13	338
Deep	3	12	20	35
Flowing	72	233	781	1086
Total	295	350	814	1459

ADEQUACY OF SUPPLY

In order to ascertain the adequacy of present well water supplies of Brown county for current needs, users were asked whether or not present supplies were adequate for the use at the time. Replies indicate that in most cases supplies obtained were adequate. Changes in supply, at the source, and modification of farm management and land utilization will at any time alter not only the supply but also the demand for well water.

On the whole, in Brown county, shallow wells are adequate for a larger percentage of users than in many nearby counties. However, 17.4 per cent were reported inadequate for current use. Inadequate wells are not restricted to any part of the county.

On the other hand, deep pumped wells are inadequate as a rule, since less than one fourth were reported to furnish supplies sufficient for current use. A very large per cent, 78 per cent, were reported inadequate. Since the cost of these wells is considerable and since they appear to be unsatisfactory as a rule, farmers and land-farm owners of Brown county are warned not to con-

sider development of additional wells of this type without careful investigation by a thoroughly qualified agency.

Flowing wells are generally adequate but even among these nearly one fifth, 19.3 per cent, were reported inadequate for current needs. In part, inadequacy is the result of casing of insufficient diameter, or because of inadequate flow. Presumably many reported inadequate are those which are reported to be decreasing in rate of flow since most flowing wells, 85.6 per cent of 883 reported, have decreased in flow. Some were reported, 10.8 per cent, to have diminshed in flow, and a few, 3.6 per cent, were reported to have increased in flow. Although decrease in flow, in some cases, is probably due to lack of necessary repairs on the well, evidence indicates that, in most cases, decrease is due to diminished artesian pressure. Wastes of artesian water should be discouraged if further inadequacy of flowing wells is to be avoided. Reduction of artesian head will eventually cause many flowing wells to stop flowing so that pumping will be necessary.

IRRIGATION

Water from wells in Brown county is used to irrigate small plots, commonly of farm garden size. Twenty five shallow wells were reported to be used to irrigate 12 acres, varying in size from one eighth to five acres, and 75 flowing wells were in use to irrigate approximately 28 acres in plots varying in size from one eighth to three acres. No deep pumped wells were reported in use for irrigation.

SUPPLEMENTARY WATER SUPPLIES

In any area where water supplies are hard, or where wells are unsatisfactory for drinking, cisterns provide important supplementary supplies. Cisterns are of some importance in Brown county and are reported on a ratio of approximately one cistern to twelve wells, or about three to each township. A

total of 126 cisterns was reported. The cisterns in Brown county, where most wells provide soft water, are about one third as numerous as in counties where well water supplies are hard. Most of them are supplied directly by rain, 73.8 per cent, and water is hauled to 22.2 per cent. Most of the cisterns are used for laundry purposes, 80.3 per cent, but some, 19.7 per cent, are used for cooking and for drinking.

BROWN COUNTY

Table 1.

DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
121	60	13	12	32	21	6	5	2	1	3	12	1	1	-
121	61	6	20	40	31	5	1	-	1	2	4	2	-	-
121	64	4	16	48	29	3	-	1	-	1	4	-	1	1
121	65	5	12	48	31	5	-	-	1	2	4	1	-	-
122	60	9	7	35	21	6	2	1	-	-	6	3	1	5
122	61	4	24	49	32	3	-	-	-	1	3	1	-	-
122	62	6	20	40	32	5	-	-	-	-	4	2	-	-
122	63	2	48	48	48	2	-	-	-	-	2	-	-	-
122	64	5	12	26	21	2	2	-	-	1	5	-	-	-
122	65	9	11	47	31	7	1	-	1	-	8	1	2	1
123	60	3	32	37	35	2	1	-	-	-	2	1	-	-
123	62	5	20	36	26	5	-	-	-	-	3	2	-	-
123	63	12	14	87	34	7	4	1	2	5	11	1	1	1/2
123	64	16	12	100	32	5	10	1	4	5	14	2	2	3
123	65	3	10	20	17	-	1	2	1	1	-	3	1	-
124	60	1	-	-	30	1	-	-	-	-	-	1	-	-
124	61	7	25	40	31	3	2	1	-	1	7	-	-	-
124	62	4	28	60	43	3	1	-	2	2	3	1	-	-
124	63	22	13	25	17	12	6	2	1	2	21	1	1	-
124	64	30	11	44	26	17	13	-	1	-	30	-	3	1/2
124	65	2	10	15	13	1	1	-	-	-	2	-	-	-
125	60	5	20	30	25	3	1	-	1	-	5	-	-	-
125	61	5	14	30	23	3	2	-	-	-	5	-	-	-
125	62	5	30	34	33	5	-	-	-	-	3	2	-	-
125	63	5	20	76	36	3	2	-	1	-	4	1	-	-
125	64	12	8	48	27	11	1	-	1	-	9	3	1	-
125	65	3	12	42	22	3	-	-	-	-	1	2	1	-
126	60	7	18	25	21	3	4	-	-	-	7	-	-	-
126	61	7	20	36	28	3	2	-	1	1	5	2	1	-
126	62	2	95	100	98	-	1	-	-	1	1	1	-	-
126	63	12	18	32	26	7	4	1	-	-	12	-	1	-
126	64	11	22	47	35	11	-	-	1	-	9	2	1	1/2
126	65	3	10	14	12	1	2	-	-	-	3	-	-	-

BROWN COUNTY

Table 1. (Continued)

DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
127	60	8	20	147	59	1	5	-	1	1	6	2	1	-
127	61	5	22	36	24	4	1	-	-	-	5	-	-	-
127	62	4	16	50	32	2	2	-	-	-	3	1	-	-
127	63	17	20	65	32	15	2	-	1	4	13	4	1	-
127	64	10	12	31	22	5	5	-	1	1	9	1	-	-
127	65	7	12	28	21	4	3	-	1	1	3	4	-	-
128	60	19	14	50	30	13	2	-	2	4	17	2	3	1/2
128	61	10	12	90	47	4	6	-	-	-	7	3	1	-
128	62	2	10	18	14	-	1	1	-	-	1	1	-	-
128	63	11	20	45	29	10	1	-	-	-	7	4	1	-
128	64	7	20	90	42	6	1	-	1	-	5	2	-	-
128	65	10	12	36	23	3	7	-	2	3	8	2	1	-
Total		335				220	105	13	29	42	293	62	25	12

Note: No wells reported from the following townships and ranges for this group: T.121N.,R.62,63W; T.123N., R.61W.

BROWN COUNTY

Table 2.

DATA ON PUMPED WELLS OVER 200 FEET IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated.
121	60	6	1000	1080	1045	1	3	2	3	1	2	4	-	-
121	61	3	940	1000	970	-	-	2	-	-	1	2	-	-
121	62	3	912	1000	954	-	-	1	8	-	-	3	-	-
121	65	3	1050	1100	1074	-	-	-	-	-	-	3	-	-
122	60	2	1000	1050	1025	-	1	-	-	-	1	1	-	-
122	60	5	900	1000	984	-	-	1	-	-	-	5	-	-
122	63	3	960	975	968	-	-	1	-	-	1	2	-	-
122	65	10	960	1140	1046	-	1	1	1	1	2	8	-	-
123	60	4	950	1000	983	1	-	-	1	1	-	4	-	-
123	63	4	950	1200	1055	-	1	2	1	1	1	3	-	-
123	64	2	900	1000	950	-	1	-	-	-	-	2	-	-
123	65	4	1100	1300	1183	-	-	1	-	1	-	4	-	-
124	60	2	990	1000	995	-	-	-	-	-	-	2	-	-
124	61	1	-	-	880	-	-	1	-	-	-	1	-	-
124	62	3	800	1000	900	-	1	1	-	-	-	3	-	-
124	65	3	1220	1260	1240	-	1	2	1	1	2	1	-	-
125	65	2	1050	1300	1175	-	1	-	-	1	1	1	-	-
126	60	4	850	1000	913	-	1	-	-	-	-	4	-	-
126	61	1	-	-	900	-	-	-	-	-	-	1	-	-
126	62	5	960	1158	1059	-	-	1	-	-	1	4	-	-
126	63	1	-	-	1100	-	-	1	1	-	-	1	-	-
126	64	3	1040	1120	1080	-	-	-	-	-	-	3	-	-
127	60	1	-	-	900	-	-	1	-	-	1	-	-	-
127	63	2	1183	1206	1195	-	-	2	-	-	2	-	-	-
128	60	3	500	900	760	-	1	-	-	-	2	1	-	-
128	63	1	-	-	1200	1	-	-	-	-	1	-	-	-
128	65	1	-	-	-	-	-	-	-	-	-	1	-	-
Total		82				3	12	20	16	7	18	64	-	-

Note: No wells reported for this group from the following townships and ranges: T.121N.,R.63,64W; T.122N., R.61, 64W; T.123N., R.61,62W; T.124N., R.63,64,W; T.125N., R.60,61,62,63,64W; T.126N., R.65W; T.127N., R.61,62,64,65W; T.128N., R.61,62,64W:

BROWN COUNTY

Table 3.

DATA ON FLOWING WELLS

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY					
Twp.	Rge		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approx. Acres Irrigated	Ave. Callon Per Min	Number Con-trolled
121	60	20	500	1250	966	-	4	16	1	-	16	4	2	1/8	4.0	9
121	61	28	900	1100	979	3	3	20	5	2	27	1	4	2 1/4	3.6	16
121	62	32	780	1110	963	1	7	24	-	-	27	5	1	1/4	3.8	13
121	63	26	900	1350	1033	-	1	25	1	2	22	4	1	-	4.7	9
121	64	30	720	1400	1012	3	3	24	6	1	27	3	2	1/4	5.4	15
121	65	32	920	1200	1074	5	10	15	10	-	24	8	3	5/8	5.4	10
122	60	20	700	1200	980	-	3	15	4	-	18	2	1	1/8	3.8	8
122	61	35	900	1160	998	2	7	25	7	-	29	6	1	1/8	2.1	15
122	62	34	840	1335	1005	5	6	19	5	2	26	8	1	1/8	3.8	10
122	63	36	900	1200	1032	2	8	22	8	2	26	10	2	1/4	3.9	16
122	64	23	900	1600	1054	1	3	15	4	1	16	7	1	-	2.9	9
122	65	28	900	1680	1129	1	17	10	5	-	18	10	4	1 3/8	2.0	6
123	60	34	700	1250	983	1	10	22	5	1	31	3	2	1/4	3.4	15
123	61	29	850	1127	979	5	7	15	6	1	24	5	4	1 1/2	3.4	15
123	62	35	890	1200	1014	1	8	26	7	-	31	4	2	1/8	3.1	12
123	63	27	525	1300	1049	3	7	17	4	1	24	3	2	1 1/4	2.9	14
123	64	16	800	1430	1127	5	6	5	5	1	10	6	4	3 3/8	4.2	8
123	65	24	800	1800	1223	9	4	10	13	-	18	6	8	3 1/4	4.2	10
124	60	26	780	1100	951	-	8	16	1	-	24	2	5	5/8	3.9	15
124	61	31	800	1260	999	1	11	18	5	-	28	3	2	1/2	3.1	13
124	62	31	600	1130	975	1	7	23	4	-	23	8	1	1/8	3.4	9
124	63	19	500	1500	1037	-	1	16	5	2	15	4	1	1/2	2.6	12
124	64	14	800	1370	1084	1	2	10	4	2	7	7	2	1/4	3.4	2
124	65	13	1000	1398	1212	1	5	6	2	2	6	7	2	1 1/4	4.7	1
125	60	27	250	1050	889	1	3	22	3	2	23	4	-	-	8.0	10
125	61	14	900	1140	967	-	5	7	5	1	14	-	1	-	4.0	6
125	62	26	910	1400	1019	-	2	22	5	-	23	3	-	-	7.4	11
125	63	30	890	1365	1013	-	3	27	10	1	24	6	1	1/4	5.3	13
125	64	23	980	1300	1114	2	1	18	4	3	19	4	1	1/2	2.5	4
125	65	16	1065	1530	1270	2	5	6	4	1	10	6	-	-	4.9	1

BROWN COUNTY

Table 3. (Cont.)

DATA ON FLOWING WELLS

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY					
Twp.	Rge		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inadequate	Number used for Irrigation	Approx. Acres Irrigated	Ave. Gallon Per Min	Number Controlled
126	60	22	460	1400	948	1	2	18	6	1	19	3	-	-	4.3	11
126	61	20	860	1100	987	1	2	13	6	-	15	5	-	-	5.3	5
126	62	20	860	1280	1037	-	2	15	1	1	18	2	2	1	7.9	6
126	63	19	800	1150	1017	-	5	14	2	-	13	6	-	-	3.5	8
126	64	24	860	1345	1126	1	10	12	8	3	18	6	1	1/8	8.1	5
126	65	13	1000	1300	1166	1	2	9	1	-	11	2	2	1/4	2.5	4
127	60	24	800	1000	883	-	-	23	6	1	24	-	-	-	4.6	5
127	61	19	800	1050	956	-	1	16	4	-	16	3	-	-	3.4	7
127	62	29	700	1200	1014	-	3	21	3	1	17	12	-	-	4.2	12
127	63	21	950	1470	1129	-	5	14	4	2	17	4	1	1/2	3.8	7
127	64	18	950	1500	1136	1	3	13	8	1	9	9	1	3/4	2.2	5
127	65	10	900	1365	1226	1	6	3	4	-	7	3	1	1/4	4.7	1
128	60	17	800	1200	911	-	2	15	1	1	17	-	2	1 1/4	5.8	4
128	61	18	800	1400	1005	-	3	15	5	-	16	2	-	-	5.5	5
128	62	35	880	1350	1041	4	6	25	1	3	29	6	2	1/8	4.2	11
128	63	26	960	1350	1160	6	4	16	5	1	21	5	2	1/2	14.4	14
128	64	21	1050	1400	1160	-	2	15	1	2	18	3	-	-	2.8	4
128	65	18	1100	1280	1166	-	8	8	7	-	15	3	-	-	6.9	5
Total		1153				72	233	781	221	45	930	223	75	24		426

BROWN COUNTY WELL NOTES

The following are pertinent remarks quoted from questionnaires returned by farmers and are included opinions of the water situation as expressed by the individual farmers and must be so applied.

T.121N., R.60W. NW¼ Sec. 26 — 1020 feet:
"Water level is settling away about 2 ft. a year. The artesian head seems to be going down each year. We have tried for a surface well but never have been able to get water."

T.121N., R.64W. SE¼ Sec. 6 — 900 feet:
"Years ago an artesian well was drilled 15 rods from present well. Some time later it filled with lignite and had to be abandoned. Present well shows just a trace of lignite particles."

T.121N., R.65W. NW¼ Sec. 22 — 960 feet:
"In 1933 we dug a surface well in NE 21-121-65 to depth of 12 feet but water was so salty the stock would not drink it. When water in tank from this surface well evaporated there were layers of crystals almost 1/8 inch thick."

T.122N., R.64W. SW¼ Sec. 31 — 1280 feet:
"A lot of trouble with quicksand drilling artesian wells. Hard to get drillers to drill in this area on this account. Can get good surface water at about 40 ft."

T.122N., R.64W. SW¼ Sec. 34 — 1000 feet:
"Construction of surface wells difficult on account of quicksand."

T.26N., R.64W. SE¼ Sec. 12 — 1100 feet:
"Water in this well is very gassy and not suitable for people drinking it. Surface water is no good."

T.127N., R.60W. SE¼ Sec. 21 — 147 feet:
"Water discolored from rust and has bad odor. Causes sickness from stomach trouble."

EXTENSION SERVICE
SOUTH DAKOTA STATE COLLEGE
of Agriculture and Mechanic Arts
Brookings, South Dakota

Published and distributed under Acts of Congress, May 8 and June 30, 1914, by the Agricultural Extension Service of the South Dakota State College of Agriculture and Mechanic Arts, Brookings, A. M. EBERLE, *Director*, U. S. Department of Agriculture cooperating.